State of Tennessee
Department of Commerce and Insurance
Board of Architectural and Engineering Examiners
500 James Robertson Parkway, Third Floor Nashville, TN 37243-1142
800-256-5758 615-741-3221 (Nashville Area) 615-532-9410 (Fax)

STANDARD OF CARE FOR FIRE PROTECTION SYSTEM DESIGN

(Effective Date April 1, 2003)

I. Scaled floor plan drawings on sheets of uniform size, no smaller scale than 1/8"=1'0" to include the following information:

A. Name of owner.
B. Location, including street address.
C. Point of compass.
D. Floor plan of each floor (if identical floors, typical plan permitted).
E. Description of occupancy and commodity classification as defined in Chapter 2 of NFPA 13, *Standard for the Installation of Sprinkler Systems,* 1999 edition.
F. Type of construction and building height in feet.
G. Full height building cross section if required to clarify installation of system.
H. Location of fire walls, large unprotected floor openings, unprotected window openings, fire doors.
I. Distances to and construction and occupancy of adjacent or nearby exposing buildings or structures where additional protection may be required, e.g., exposure protection.
J. Type, temperature ratings, and locations of all sprinkler heads in finished areas. Areas subject to build-out at a future date may be described by notes delineating spacing, type of sprinkler heads, etc.
K. Size and location of risers and standpipes with description and arrangement of valving and accessories, including the location of any and all hose valves, alarms, and signal devices.
    1. Area protected by each riser, each system, each floor.
L. Size and location of all mains and branch lines as required to provide preliminary hydraulic calculations. (See Section III-A, Hydraulic Calculations for further information.)
M. If the project is in a seismic area, information attesting to this shall be included on the drawings or in the specifications.
N. The location and size of the hydraulically remote area of coverage.
O. Fire pump design, specifications and room layout (if required).
P. Standpipe design (if required) must be completely delineated on the drawings.
Q. If extensions are made to existing systems, the same information shall be provided for the existing as well as that for the extension, including point of connection to the existing main.
R. The design drawings shall fully identify the intent of the type of system, such as dry, wet, preaction, and/or deluge.
S. The engineer shall establish a practical and flexible margin of safety between available water pressure and required demand pressure.

II. Site Plans: The plan (may be combined with floor plans) shall be drawn to scale and shall include all essential details such as:

A. Size and location of all water supplies.
B. Size and location of all piping, indicating, where possible, the class and type of new pipe to be installed, and the depth to which it is to be buried.
C. Indicate size, type, and location of valves. Indicate if located in pit or if operation is by post indicator or key wrench through a curb box.
D. Indicate the size, type, and location of meters, and backflow devices.
E. Size and location of hydrants, showing size and number of outlets, and if outlets are to be equipped with independent gate valves. Indicate if hose houses and equipment are to be provided and by whom.
F. Sprinkler and standpipe risers and monitor nozzles to be supplied by the system.

G. Location of fire department connections; if part of private fire service main system, including detail of connections.
H. Water Supply Information:
   1. Information regarding whether the main is circulating or dead end.
   2. Pressures under flowing and static conditions. If available, information on orifice size and co-efficient of orifice used in the test, as well as pitot pressure.
   3. Applicable elevations of slab, floors, ceilings, street main connection, etc.
   4. Information regarding who conducted flow test, when, and where the test was conducted. If reliable or current (less than six months old), information is not available, a new flow test should be done under the supervision of the registrant.

III. Hydraulic calculations.

A. The Engineer shall prepare and submit preliminary hydraulic calculations proving availability of adequate water, (volume and pressure) for protection of the area of greatest demand. This shall be for the hydraulically most remote area, or if present, the standpipe demand. Calculations shall include the information required by NFPA-13.

IV. Specifications

A. Specifications shall be prepared for fire protection the same as for any other portion of the project.

V. Engineer's Seal

A. The engineer of record submitting fire protection system design construction documents shall seal, sign, and date each page or sheet of drawings and the first page of specifications and calculations.

VI. Legend

A. The work to be performed by the fire sprinkler contractor and the site utility contractor should be differentiated on the drawings. Installation work shall be performed in accordance with applicable state law, including but not limited to, Tennessee Code Annotated, Title 62, Chapters 6 (General Contractors) and 32 (Fire Sprinklers Contractors) and the following rules chapter of the Department of Commerce and Insurance Division of Fire Prevention, 0780-2-7.

Adopted 11-1-1990
Revised and adopted 09-20-2002

FIRE PROTECTION SYSTEMS DESIGN – COMMENTARY

The Standard of Care for Fire Protection Systems Design should be interpreted as a minimum standard of design. Nothing in the Standard of Care is intended to imply that this is the maximum allowable effort by the engineer. Just as the National Fire Protection Association is a minimum requirement (a fact often overlooked) so is the Standard of Care for engineers. There will always be local job conditions, which will influence the amount of fire protection required for the project. An example would be a case where adequate water is not available for manual fire fighting (fire department), so an agreement is reached with the Authority Having Jurisdiction to increase the level of sprinkler density inside the building.

The preliminary calculations referenced in the Standard of Care refer to those calculations initially done by the engineer to prove availability of an adequate water supply in terms of both volume and pressure. Typically, these initial design calculations will involve the few hydraulic nodes from a point of known pressure and volume directly to the area of most demand. In a high rise building this could be as simple as proving availability of an adequate volume and pressure of water to meet the standpipe requirements,

a task which should be within the capability of any Mechanical Engineer. If the worst area of demand cannot be satisfied, another alternative must be provided (such as a fire pump) per code.

In a building with several different occupancies and fire loadings, only the worst demand need be calculated. This again on a high rise would be the standpipe demand, but for this discussion, let's assume a one-story building. If the building in this scenario had five different areas, four of which were light hazard, and one that was Ordinary Hazard Group II, only the Ordinary Hazard area would need to be calculated.

The engineer shall establish a practical and flexible margin of safety between the available water pressure and the required demand pressure. Consideration should be given to the probable differences in the sprinkler contractor's calculations and the calculations done by the engineer. When sizing pipe using his/her initial design calculations, the registrant should leave more safety margin than he would require the contractor to leave. The difference in the two margins is due to the fact that the contractor's calculations will (should) enumerate the various fittings and offsets that probably will not be delineated in the engineer's preliminary design.

Recalculation by the engineer typically will not be required if field changes become involved, either intended or unforeseen. Deviations in the field such as offsets around ductwork should be anticipated, and initial design calculations by the engineer containing a reasonable, practical pressure safety margin should cover these. Hardly any job is installed exactly like it is drawn, there are always field conditions requiring a change. Substantial deviations can and should require the contractor to prove his calculations are still adequate to provide the protection stipulated in the design documents.

A substantial deviation, such as a contractor's proposal for a major design change shall be recalculated and redrawn by the contractor's own Responsible Managing Employee, along with the Responsible Managing Employee's stamp certifying his preparation and submitted for approval and documentation. If a competent sprinkler contractor submits a reasonable proposal for change, and if the contractor's Responsible Managing Employee prepared drawings and calculations meet all the requirements of the engineer's design and there is not a valid reason why the engineer has used a different layout configuration, the engineer probably will (and should) accept the contractor's drawings and calculations.

The contractor's shop drawings and calculations should be submitted to the engineer of record first; the engineer of record records his review via his shop drawing stamp; then the contractor's shop drawings and calculations are sent to the reviewing authority for documentation. The reviewing authority will accept the sprinkler contractor's drawings and calculations even if different from the preliminary design submitted by the engineer as long as they bear an approval stamp from the engineer of record. No actual installation should begin prior to the implementation of this protocol.

Regarding the subject of stamps, some people have mistakenly thought this referred to the Professional Engineer's seal. This is erroneous, what is being referred to is the stamp of approval, rejection, approved as noted, etc. The engineer should never put his P.E. seal on the sprinkler contractor's drawings or calculations unless he actually prepared them.

The water supply information and flow testing addressed in the Standard of Care asks for a flow test less than six months old. This is desirable, but it is understood there may be circumstances that would prevent this, e.g. a local utility has record of a flow test one year old and will not allow a flow test to be performed by anyone other than their personnel. The authority having jurisdiction will allow some latitude in cases such as this. Also, the engineer does not have to perform the actual flow test, but should verify the accuracy of it.

The registrant's drawings should clearly indicate the point at which the plumbing or site utilities contractor stops and the fire protection sprinkler contractor begins work. This includes that portion of the underground piping to be installed by a licensed fire sprinkler contractor. This point, the so called point of service, is defined in state law, including but not limited to, Tennessee Code Annotated, Title 62, Chapters 6 (General Contractors) and 32 (Fire Sprinkler Contractors) and Rules Chapter 0780-2-7 of the

Department of Commerce and Insurance. The drawings are to be done to assure continuity in materials and performance in accordance with the various codes, especially National Fire Protection Association, Chapters #13 and #24.